THE FEMALE OF *FORMICA OPACIVENTRIS* EMERY (FORMICIDAE)

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The forms of *Formica exsecta* constitute a small, well defined group of ants easily recognized by the excavated, or broadly emarginate, occipital border of the head. Only three of the North American variants are now considered valid (Creighton, 1950, for synonymy). All the castes of *Formica exsectoides* and *F. ulkei* have been described previously, but the worker and male alone were the castes hitherto known for *F. opaciventris*, the female having escaped collection. I am now able, however, to fill this gap by presentation of the description of the *opaciventris* queen.

Dr. Creighton cites the mountains of Colorado and Wyoming as the range of this species, and states that it appears to be confined to high intermountain valleys, and does not occur on the eastern slope of the Rockies. The nests he observed were built in hard, stony soil, and consequently differed much from the nests of the eastern *exsectoides* and *ulkei* which are usually in moist, spongy earth.

Near the village of Valmont, Colorado, five miles east of Boulder, is an assemblage of mound nests of *Formica* readily visible from the road. The nests are in a low, moist meadow at approximately 5160 feet, and partly arranged with reference to the water table in that most of them are present on slightly higher ground and fewer are in the swales where alkali accumulates from the evaporation of water.

These mounds are occupied largely by *Formica altipetens*, but some are constructed by *opaciventris*. With Dr. Creighton, I visited the area on November 29, 1950, and by careful excavation of one of the nests, we discovered the single deälated female of *Formica opaciventris*. This

was much better luck than we had any right to expect, especially in view of the fact that it was the first nest completely dug into, and also that no other queens were taken from the colony. Though we tried other nests, no further specimens of females of this species were obtained, and no winged forms, male or female, were found either. The queen was brought to the laboratory and kept in an observation nest for four months (until April 2, 1951), after which she was preserved. During the period, a few eggs were laid but only three workers were reared to maturity, and these were all much smaller than the workers from the original colony which were brought with the queen and kept with her in the artificial nest. No positive information was gleaned regarding the species of ant which serves as host for the incipient colonies of *opaciventris,* but it seems probable that *altipetens* may function in this capacity, owing to the fact that so many nests of the latter were present in the pasture where the *opaciventris* colonies were found. We did not turn up any incipient nests of the parasitic species, nor did we find any mixed colonies of the two ants, though we searched for them. It has never been established that *opaciventris* is truly a temporary social parasite, and its host is still unknown; however, it has been shown that *exsectoides* and *ulkei* both utilize *F. fusca,* so it will be no surprise if *opaciventris* is found eventually to use *fusca* or some related species. The well developed trichomes, or brushes of short hairs, on the mesonotum of the queen are strong evidence in favor of such a prediction.

Formica opaciventris Emery

Female: — Length 10.5 mm.; head index 0.96.

Head subquadrate, almost as wide as long; sides straight but distinctly converging anteriorly; greatest width occurs just behind the eyes; occipital border broadly and definitely excised. Clypeus entire, with only a slight point at the middle of the anterior margin, and an indistinct carina. Frontal area well defined and triangular. Antennal scapes slender though gradually increasing in thickness toward the tips, and surpassing the occipital angles by a distance

equal to about ⅓ of their lengths. Eyes of the usual shape (oval), rather flat, and situated posterior to the middle of the head. Mandibles triangular, with 5 to 6 more or less distinct teeth, and no denticles along the basal border. Frontal carinae short (about twice as long as the diameter of the antennal fossae), straight, and strongly divergent. Ocelli distinct.

Thorax somewhat narrower than the head, dorsum almost flat in profile. Scutum broadly egg-shaped with prominent parapsidal furrows; scutellar sclerites well developed laterally, obsolete medially; postscutellum trapezoidal, moderately elevated above the metanotum. Epinotum rounded dorsally and laterally; basal face short and the declivity long and sloping, with the angle between them indistinct, indicated only by the greatest convexity of the epinotal profile. Petiolar scale extremely broad with straight sides, giving it a decidedly quadrate appearance, especially when viewed from the front; slightly convex anteriorly and flat posteriorly; superior border sharp, faintly emarginate in the middle, and expanded into small spatulate lobes at the upper corners of the scale. Spiracular openings on the petiole form prominent denticles on the sides near the base of the scale. Wings are absent on the specimen, but ragged fragments of the bases of both anterior wings and the left posterior wing present. Abdomen oval and of the usual formicine shape.

Head opaque, except the frontal area and corners of the clypeus which are somewhat smooth and shining. Mandibles striated but otherwise shining. Thorax subopaque, rather faintly shining on the mesonotum and near the sutures. Petiole and gaster subopaque, the surfaces less heavily shagreened so that their shiny appearance is not completely obscured.

Erect hairs present on the frons, clypeus, vertex, mandibles, top of pro-, meso-, and metanotum, posterior face and peduncle of the petiole, anterior margin of gaster, venter, dorsum of last three gastric segments, coxae, and a very few on the femora. Tibiae with graduated bristles on the flexor surfaces. The scutellum has on each side a

trichome of short, curved, golden hairs distinct from the other more scattered hairs on the thorax. Hairs absent on the gula, occiput, antennal scapes, thoracic pleurae, and most of the dorsum of the first two gastric segments. All hairs are golden yellow, coarse, irregular in length, and blunt but not spatulate. A few, short scattered hairs occur on the eyes. Pubescence dilute.

Color of head, most of thorax, petiole, base of gaster, and the legs ferruginous red, mandibles darker red. Ocellar triangle, postscutellum, and metanotum deeply infuscated. Gaster infuscated except at base, becoming dark brown to black toward the tip. Wings, as far as can be seen from the broken basal pieces, straw-colored.

Gynetype: one deälated female (Queen of a mature colony). Collection of R. E. Gregg.

Direct comparison with eleven females of *F. ulkei* in the collection of the author (three of which retain wings), showed that this species may be distinguished from the queen of *opaciventris* by a slightly more quadrate head (head index of 1.0), the postscutellum faintly more concave in profile, the scale of the petiole more convex along its superior border and tapering to a narrower base where it attaches to the peduncle, hairs very much longer, more abundant and curly on the thorax and petiole, and sculpture weak, leaving the head, thorax, and abdomen very shining. In color, *ulkei* shows the posterior one-half to two-thirds of the head very dark brown to black, with the anterior portion yellowish red, the promesonotal suture darkened, longitudinal stripes of infuscation on the scutum, mesopleurae and a spot on the propleurae dark brown, infuscation of the postscutellum confined to the posterior margin, and the gaster concolorous without a basal patch of red.

Two winged females of *exsectoides* also available for study made possible the following comparisons. The female of *opaciventris* differs from that of *exsectoides* in having distinctly more dilute gastric pubescence, long hairs on the anterior margin of the first segment of the gaster and on the petiolar scale, shorter but much more numerous hairs on the thorax, and hairs on the lower angle of the

pronotum and on all coxae. The distinct scutellar trichomes of *opaciventris* are lacking on my specimens of *exsectoides*, but this cannot be assumed to be the result of rubbing and old age, for the youth of these females is attested by their retention of wings. Wheeler (1913) alludes to small tufts of flexuous hairs on the mesonotum in his description of the queen of *exsectoides* but does not definitely state that they are trichomes. He also states that the color is like that of the worker, being deep red, with the gaster black and the mandibles, legs, vertex, funiculi, and dorsal portions of the thorax sometimes brownish or dark red. One of my specimens of *exsectoides* has no infuscation of the head or thorax except on the vertex, while the other female is heavily infuscated on all parts. Any minor color differences, therefore, which exist between *exsectoides* and *opaciventris* probably should be regarded as inconsequential. Finally, the scale on the petiole of *opaciventris* has spatulate corners, but there is no such trait in *exsectoides* typicus.

A worker and a female of the ant *exsectoides* var. *davisi* Wheeler (1913), labeled "cotype", have also been examined, and I am in agreement with Creighton that this form is a synonym of the eastern *exsectoides*. The only detectable differences between these insects are that the *davisi* female has somewhat shorter hairs and is practically devoid of gastric pubescence.

Wheeler further described the variation *hesperia* from diminutive workers, and Creighton has recently invalidated it too. A cotype worker of this ant (in the Creighton collection), checked against specimens of *exsectoides* which I have from Illinois and New York, showed the ant to be almost identical with the small workers of the typical species, particularly with respect to color, hair pattern, and shape and size of the petiolar scale. The scale is not like that of *F. dakotensis*, as contended by Wheeler, but has rather a sharp, elevated, and evenly curved superior border. Dr. Creighton (1950, p. 514), seems to be quite justified in submerging *hesperia* as a synonym of *exsectoides*. The sole difference I could find between the two is an insignificantly broader head with slightly shallower occipital emargination, but this is the sort of variation one

would expect to find even in a nest series of *exsectoides*. It must be remembered that the types of the supposed *hesperia* came from Colorado Springs.

To return to the species of greatest concern in this paper, Creighton believes that *opaciventris* should stand as a well defined form and not as a subspecies of *exsectoides* where it was placed by Wheeler in 1913. Emery had originally described it as a variety of the same in 1893. Creighton's treatment may be the wiser, but from the descriptions of differences among the females as noted above, and the workers which also differ only in the greater pilosity of *opaciventris*, it may be necessary to return to Wheeler's proposal. The differences enumerated, at best, seem to be rather slight, hence it would appear possible to consider the two ants as very closely related with *opaciventris* a subspecies of *exsectoides*. Moreover, the ranges of these insects, though heretofore regarded as far apart, actually overlap, but the degree of overlap is at present very uncertain. Creighton gives Nova Scotia to Georgia and west to Wisconsin and Iowa as the territory of *exsectoides*, while *opaciventris* is a Rocky Mountain form. Specimens of both of these species are present in my collections from the vicinity of Boulder, Colorado, the former from foothills at about 7500 feet, and the latter from the plains at slightly over 5000 feet. Thus we have to revise westward our conception of the range of *exsectoides*, and the range of *opaciventris* is now known to extend to lower altitudes and perhaps eastward on the plains. It may be found, when more material is gathered, that the two forms intergrade, and if so they will have to be classed as subspecies.

Formica ulkei should stand alone as a distinct species. The ranges of *ulkei* and *exsectoides* are known to overlap in northern Illinois and Indiana, southern Wisconsin, and Iowa, but the ants remain morphologically distinct even though the nests of each are practically identical in appearance. I have specimens of *ulkei* and *exsectoides* collected within a few hundred feet of each other at Palos Park, Illinois, and there is not the faintest indication of intergradation. In the case of these two species, then, we have nothing to show that one could be a subspecies of the

other. *F. ulkei* is a boreal form whose main range is in the northern tier of states and southern Canada.

Literature Cited

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Emery, C.
1893. Beiträge zur Kenntnis der nordamerikanischen Ameisen-fauna. Zool. Jahrb. Syst., 7:633-682.

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Correction to the Synonymy of the Ant Camponotus formosensis Wheeler.—In a joint paper (Yasumatsu and Brown, 1951, Jour. Fac. Agr., Univ. Kyushu, 10, cf. p. 42), the synonymy of *Camponotus formosensis* is cited incorrectly. Due to an unfortunate clerical error, the name *Camponotus maculatus taylori* var. *formosae* Wheeler and the variant nomenclatorial equivalents *C. barbatus albosparsa* var. *formosae*, Emery and *C. barbatus taylori* var. *formosae*, Teranishi were wrongly included in this formal list of synonyms and must now be removed. The variety *formosae*, whatever may be its relationship to *maculatus* or *barbatus*, is of course not at all closely related to *C. formosensis* or any other member of the *C. herculeanus* group.—W. L. Brown, Jr., Museum of Comparative Zoology, Harvard University.